

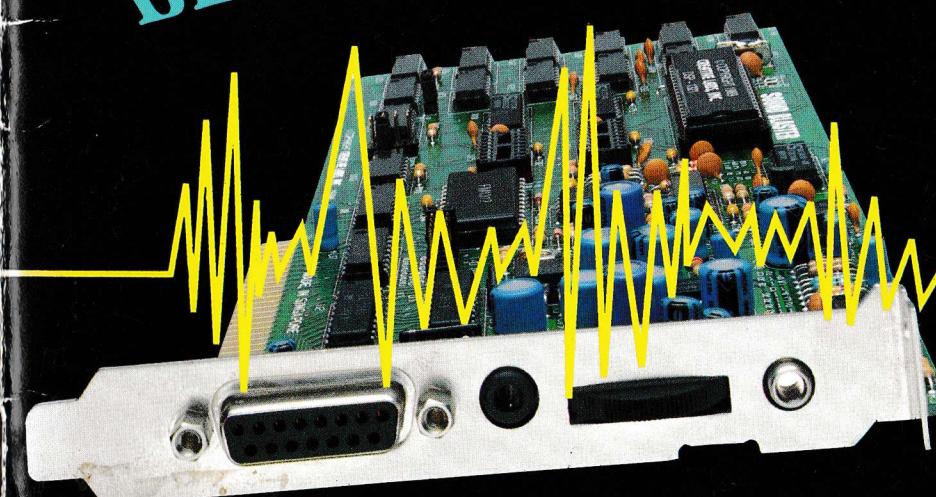
CREATIVE LABS, INC.

SOUND BLASTER

SPEECH/MUSIC/VOICE/MIDI/GAME PORT

THE ULTIMATE SOUND BOARD FOR YOUR PC

BLAST AWAY THE *PC SOUND BARRIER*



THE ALL-IN-ONE SOUND CARD
with all the great features you dreamt of ...

USER
REFERENCE
MANUAL

SOUND BLASTER

Version 1.5

USER REFERENCE MANUAL

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All cables used to connect the computer and peripherals must be able shielded and grounded. Operation with cables, connected to peripherals, which are not shielded and grounded may result in interference to radio and TV reception.

Creative Labs, Inc.

2050 Duane Avenue Santa Clara CA 95054

USA Technical Support Line: **(408) 982 9226**

Please read the "README" file, if any, for the latest information concerning the SOUND BLASTER which is not available at printing time. To read the file, type:

README

USA Technical Support Line: (408) 982 9226

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1 Introduction

CREATIVE'S SOUND BLASTER CARD

The SOUND BLASTER Card is the ultimate sound card for your PC. It converts your PC into a super entertainment and educational machine.

SOUND BLASTER clearly takes the lead by offering an all-in-one solution for your PC sound needs. Orchestra like music, special effects, real human voices or any kind of sounds can now be easily reproduced on the SOUND BLASTER.

It comes with an 11-voice FM music synthesizer which is fully AdLib* compatible, a digitized voice channel, a voice input (sampling) channel, a MIDI interface and a joystick port all built into one fabulous sound board. The bundled text-to-speech synthesizer software provides an additional high value to the package.

The built-in microphone amplifier and jack allow you to record or digitize any kind of sound you want using a normal microphone. Its DMA technology and proprietary hardware decompression algorithm further enhance its performance by conserving precious disk storage, memory and CPU time for application software.

It has a built-in stereo power amplifier that can drive any kind of speakers or headset directly. Just plug in any large speakers or any portable speakers and you are ready to go. We even provide you with a pair of stereo cables in case you want to connect to your home stereo system. It also comes with a handy volume control.

Finally, to fulfill the wishes of many users, it comes with a standard joystick port and built-in MIDI interface.

The MIDI interface is designed into the joystick port, thus saving a much needed slot on the PC. For those who are getting serious with MIDI, connection to MIDI instruments requires an additional (optional) MIDI Connector Box and cables. The MIDI connector box comes with 5 MIDI-OUTs and one MIDI-IN, a high added value by itself that comes with a low price tag. This MIDI box is plugged into the joystick port and the joystick port is replicated on the box itself.

SOUND BLASTER is destined to have the largest collection of supporting software from DAY 1. This collection is still growing rapidly.

Thank you for your purchase of the SOUND BLASTER. We're sure that you will enjoy it for many years to come.

Creative Labs, Inc.

*AdLib is a registered trademark of AdLib Inc.

2 Installation Notes

The Sound Blaster Card can be used on all IBM PC/XT, AT, 386s, PS/2 (model 25/30), Tandy (except 1000EX/HX) and compatibles.

2.1 Installing the Sound Blaster Card

1. Switch off the power supply of the computer and remove its top cover.
2. Plug the Sound Blaster Card into any free slot of the computer.
3. Connect the Sound Blaster Card to stereo speakers or headphones directly or to your home stereo set.
(Refer to figure 1)

WARNING:

The built-in stereo power amplifier has a maximum output power of 4 watts per channel with 4 ohms speakers and 2 watts per channel with 8 ohms speakers. Do not play at maximum volume if your speakers are not of the correct power.

4. Adjust the volume control of the Sound Blaster Card to mid range.
5. Put back the top cover of the computer and switch on the computer.
6. After booting from your DOS diskette, put the Sound Blaster disk containing VOXKIT into Drive A and type :

A> **TEST-SBC**

This program tests the setting of the I/O address used by Sound Blaster Card. It also tests the Interrupt Line (IRQ) used and performs a diagnostic test on the the Sound Blaster. At the end of the test, you must hear the music playing and the voice talking from your external speakers.

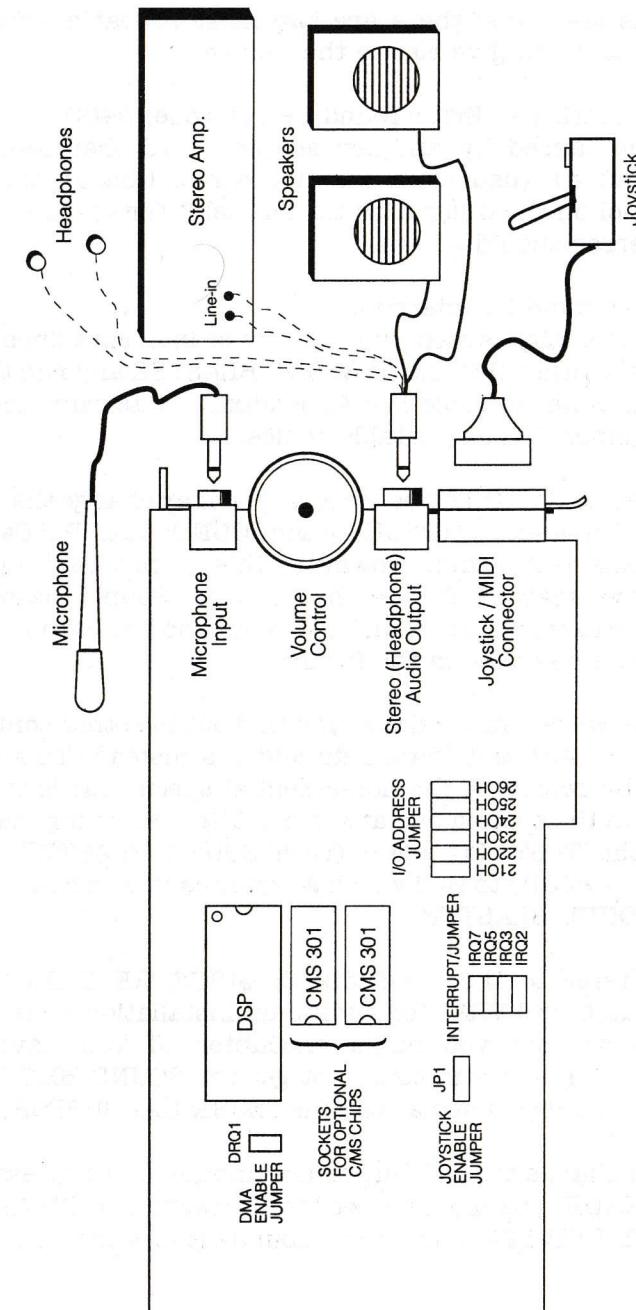


Figure 1

7. If this test fails, there are two most probable sources of conflict which give rise to the failure:

- DMA conflict - "Error found, error code: 0400" this is caused by another adapter card that uses DMA channel #1 (usually a scanner card). Change the DMA channel on the other card to channel 3 (or channel 0) and this error should go away.
- "Error found on Interrupt" this is usually caused by a conflict of interrupt lines (IRQ). Select another IRQ line on SOUND BLASTER and run the test again. Refer to Table 1 of Appendix C "Interrupt and DMA Assignment" for a suitable choice.

8. If an error on I/O address occurs, you may change the default I/O address setting (220H) of the SOUND BLASTER Card and run this test again. However, this is not recommended because, many software that support Sound Blaster will default to this address and you would not want to re-install all these software in the future.

Hence, we recommend that you find out the other conflicting adapter card and change its address instead. This can be done by removing the non-essential special cards that you have in the system one at a time. After removing one card, run the TEST-SBC again (with SOUND BLASTER on I/O address 220H) to find which adapter card is in conflict with the SOUND BLASTER.

9. Also refer to the Appendix C: QUICK REFERENCE FOR PROBLEM SOLVING for additional installation or technical problems that you might encounter. If you have tried everything and still could not get the SOUND BLASTER to work properly, you may call the TECHNICAL SUPPORT LINE.

10. If you change the IRQ line or use another I/O address other than 220H, you must proceed to the section on INSTALLING SOUND DRIVERS to install all sound drivers to this address.

2.2 Selecting Interrupt Line

The SOUND BLASTER Card requires one Hardware Interrupt Line from the CPU. There are 8 interrupts lines available on the PC: IRQ0 to IRQ7.

Four of these lines are used by the PC system, leaving 4 lines for the various peripheral devices :

IRQ2 : used by AT machines to daisy-chain

IRQ3 : may be used by Serial Port #2

IRQ5 : may be used by Fixed Disk (XT)

IRQ7 : may be used by Parallel Port (default setting)

The SOUND BLASTER Card provides a jumper to select one of these 4 Interrupt Lines. The factory default is IRQ7.

Note : The TANDY 1000 machines use IRQ7 internally, so if you have a TANDY 1000 PC, you cannot use IRQ7 on your Sound Blaster. Use IRQ2 instead.

If you change the interrupt line, you must use the INST-DRV.EXE program to install the interrupt number in the CT-VOICE.DRV routine.

See the section on INSTALLING SOUND DRIVERS.

2.3 Installing on a Hard Disk

If you have a hard disk, you can install all your SOUND BLASTER software on your hard disk by executing the hard disk installing program, INST-HD.EXE found in the disk containing VOXKIT.

To execute INST-HD.EXE, you must specify the drive name of your hard disk.

For example:

INST-HD C:

INST-HD.EXE will install the SOUND BLASTER software under a directory \SB. Several sub-directories are automatically created under this directory.

Note : Before executing any SOUND BLASTER program, you must enter this command:

SET SOUND= C:\SB ; (if you are using C:)

or

SET SOUND= D:\SB ; (if you are using D:)

(See "2.5 Set Sound Environment" for details)

Hereafter, it is assumed that you are in \SB sub-directory.

2.4 Installing Sound Drivers (INST-DRV)

This section is meant for those who have changed the default IRQ7 to another interrupt line or changed the I/O address jumper to another address. When an IRQ or I/O address is changed, the sound drivers must be re-installed with the new changes.

There are 3 sound drivers to install, they are :

- 1) CT-VOICE.DRV ; Creative voice driver for SOUND BLASTER
- 2) ORGAN.DRV ; Organ driver for Intelligent Organ
- 3) SBFMDRV.COM; FM Music driver for PLAYCMF.EXE

The CT-VOICE.DRV is found in the \VOXKIT\ sub-directory on the VOXKIT disk. It is used by VOXKIT.EXE and may be used by other voice programs. It uses one IRQ line.

The ORGAN.DRV is found in the \FMORGAN\ sub-directory on the INTELLIGENT ORGAN disk. It is used by the FMORGAN.EXE program. This driver does not use IRQ Lines.

The SBFMDRV.COM is a memory resident FM music driver found in the INTELLIGENT ORGAN disk. It is used by PLAYCMF.EXE and maybe used by other programs to play FM music. This driver does not use IRQ lines.

The CT-VOICE.DRV and ORGAN.DRV are copied to the \SB\DRV sub-directory of the hard disk.

The INST-DRV.EXE program is used for installing the I/O address and interrupt vector of these drivers. Again, you need not run this program unless you have changed any of the factory default jumpers.

INST-DRV allows you to install any drivers that are found in the directory.

Format:

INST-DRV [dir path]

eg:

To install drivers in the current directory, just enter:

> **INST-DRV** at the DOS command

To install drivers in other directory, the directory name must be supplied:

eg:

> **INST-DRV** **\SB\DRV**

Once in INST-DRV, select the correct I/O address on the screen. The Interrupt Line is automatically detected by this program, no selection is required.

Then proceed to the final section, where the name of the drivers found are displayed. Pick the drivers you want to install from the menu and then exit the program.

2.5 Set Sound Environment

As SOUND BLASTER is going to be supported by many software, it would be more desirable to have all the sound drivers kept in a single sub-directory, rather than having them all over the places.

The "SET" environment command provided by DOS allows us to set a SOUND environment. Once this is set, application programs are able to locate for the sound drivers or certain types of SOUND BLASTER files in the specified sub-directory.

You must set the sound environment each time you boot up your hard disk. To set the environment, enter the following line at the command prompt:

SET SOUND=C:\SB

(if the Sound Blaster software is installed in C:)

or

SET SOUND=D:\SB

(if the Sound Blaster software is installed in D:)

Please refer to your DOS manual for more information on the "SET" command.

The "SET SOUND=" command should be placed in your AUTOEXEC.BAT file.

Once this command is executed, all SOUND BLASTER application programs can check the DOS environment to find the required drivers or files.

Currently, VOXKIT.EXE, FMORGAN.EXE and PLAYCMF.EXE uses this method to locate their respective drivers in the \DRV sub-directory below the SET SOUND environment. If the drivers are not found in the SET SOUND environment, then the current directory is searched.

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3 Joystick Port / MIDI Connector

The Joystick Port on the SOUND BLASTER is identical to that on the standard PC Game Control Adaptor (or Game I/O port). It uses an analog joystick with a 15-pin D-Sub connector. It supports any software that uses the standard PC joystick.

This 15-pin connector also serves as the MIDI interface of the Sound Blaster. With the joystick port replicated on the optional MIDI BOX, both the MIDI device and Joystick can share one slot, leaving more room on your PC for other peripheral cards.

3.1 Disable Joystick Port

If your computer already has a joystick port (or Game I/O card), you may remove it and use the one on the Sound Blaster.

If you do not wish to remove it, perhaps that card also serves other functions, you must disable the joystick port on the Sound Blaster. This is because the two identical joystick ports will clash with each other.

Disabling the Sound Blaster joystick port can be done by removing the jumper JP1 on the card. (See figure 1 for the location of this jumper). The MIDI port is not affected by the removal of this jumper.

3.2 Double Joysticks

If you need to run two joysticks from the SOUND BLASTER Joystick Port, a Joystick Splitter Y-Cable is separately available from Creative Labs, Inc. A Y-cable from other companies might not work for Sound Blaster.

3.3 MIDI and MIDI Connector Box

The MIDI interface of the SOUND BLASTER implements the standard recommended by the International MIDI Association.

To connect the SOUND BLASTER to a MIDI keyboard (or synthesizer), you need to plug the optional MIDI Connector Box to the Joystick/MIDI connector. This MIDI Connector Box is required because the standard MIDI IN/OUT plugs will not fit the computer interface connectors.

This MIDI Connector Box provides extra value by giving one MIDI-IN and 5 MIDI-OUT connectors. Two MIDI cables are included with the MIDI Connector Box. You will not miss the joystick port as it is replicated on this MIDI Connector Box.

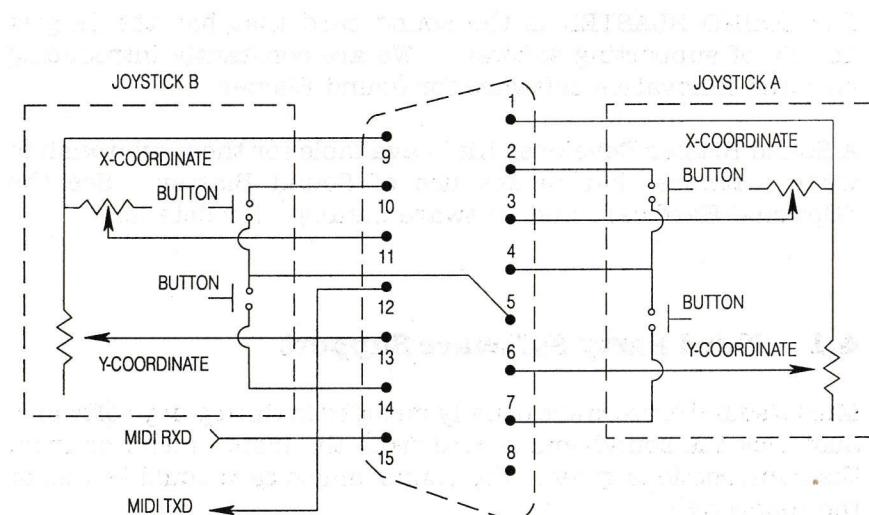
3.4 MIDI Software

A MIDI Connector Box and MIDI keyboard do not complete the list for a MIDI setup. You still need software.

The bundled FM Intelligent Organ software supports the MIDI keyboard. You are able to play on the computer keyboard as well as the MIDI keyboard.

Please ask your dealer or call Creative Labs, Inc. for the latest updates on MIDI software available for the SOUND BLASTER.

3.5 Joystick / MIDI Port Wiring Diagram



4 Using Sound Blaster with other Software

The SOUND BLASTER is the sound card that has the largest library of supporting software. We are constantly introducing new and innovative software for Sound Blaster.

A Sound Blaster Developer Kit is available for those who wish to write software that makes use of Sound Blaster. See the "Optional Hardware and Software Catalog" for details.

4.1 Third Party Software Support

Music/sound drivers are usually included in third party software. Just pick the sound/music card from the install menu or from their instructions given. The sound/music card could be one of the following :

- 1) SOUND BLASTER Card
- 2) AdLib* music card

4.2 Optional C/MS support

Sound Blaster has sockets for two optional C/MS music chips. If you purchase these 2 chips, you will get 12-voices of C/MS music. You can run software that supports C/MS or Game Blaster.

5 Talking Parrot

This mischievous parrot mimics your speech, talks back, passes outrageous remarks and even giggles when you tickle it. This fun program demonstrates the voice input and output power of the SOUND BLASTER.

Note: The Parrot program requires an AT type machine to run properly.

5.1 How to Start

1. To run this program, you need to plug a microphone to the microphone jack at the back of the SOUND BLASTER card. Make sure the microphone is switched on.
2. To run the program, type :

> PARROT

3. After a while, you will be shown a graph, with some noise wriggling at the bottom of the graph. This is the environmental noise level picked up by the microphone. You are supposed to enter a sound trigger level. This level should be about 10 counts above the noise level.
4. Hence, if the screen shows a noise level of about 130, type 140, hit [Enter] and the program will start.
5. Next, you will see a parrot appearing on the screen. After the welcoming remarks from the parrot, you can start talking to the parrot through the microphone.
6. To ensure that the parrot hears you, speak at close distance to the microphone at a suitably loud volume. Try it now, and see what happens. Say anything you like, in any language.
7. You may touch any keys on the keyboard to see the parrot's response. Or leave it alone for a while and see what happens.
8. You can continue or hit [Esc] to quit the program.

* AdLib is a registered trade mark of AdLib Inc.

5.2 Running on a different I/O Address

TALKING PARROT assumes the default I/O address of 220H. If you have installed a different I/O address for your SOUND BLASTER card, you may still run the TALKING PARROT by supplying the I/O address as a parameter in the command line:

PARROT /PADDX

where addx can be 210, 230, 240, 250 or 260 depending on which I/O address jumper you have set.

eg. Run Parrot at address 230.

> **PARROT /P230**

5.3 Video Display Selection

Normally, the TALKING PARROT software automatically detects which type of video display you have and selects the correct mode. On the CGA screen, you will notice that parrot is enlarged. This is because TEXT mode is used here to draw the parrot.

If you would like to have this big "text" parrot on your EGA or VGA display, you may use a parameter to force the TALKING PARROT to use this TEXT mode.

eg.

> **PARROT /T**

5.4 Customize Your Parrot

For those of you who want more fun out of the PARROT, you can now customize your own "Parrot". Create your own Parrot's pictures and record your own Parrot's voices.

Creating Parrot Pictures

There are 4 pictures for the Parrot program :

<u>EGA Pictures</u>	<u>CGA Pictures</u>	<u>Description of Pictures</u>
PARROT.E0	PARROT.CO	Parrot with mouth close
PARROT.E1	PARROT.C1	Parrot with mouth open
PARROT.E2	PARROT.C2	Parrot with mouth wide open
PARROT.E3	PARROT.C3	Parrot with eyes close

The 4 EGA pictures are created in PCX format. You can create your own PCX pictures using any tools that allow you to save in PCX format. Create 4 pictures using the description as guidelines and name them as PARROT.E0 to PARROT.E3. Copy these 4 pictures into your PARROT sub-directory and you get a new "Parrot".

The 4 CGA pictures are created using text characters.

Make Parrot Voices

The pre-recorded voices for the Talking Parrot are stored in the "PARROTV.VCB". This file contained 21 voices.

To create your own "PARROTV.VCB", you have to record the voices with VOXKIT.EXE and save into the files named "PVOC-?.VOC", where '?' is from 'A' to 'U'.

Make sure that:

- All the files are recorded at sampling 10,000 Hz.
- The voice data must not be packed.

- Each voice data in each file does not exceed 64k bytes.
- The sum of the size of the 21 voices must not exceed the free memory after PARROT is loaded. To be on the safe side, keep this size to less than 250K bytes.

The content of each file is shown below:

The first 10 voice files are greeting messages. These messages will be spoken randomly when the PARROT detects no input from the microphone after some time.

file PVOC-A.voc contains	"Hello there ! "
file PVOC-B.voc contains	"Hi ! how are you ? "
file PVOC-C.voc contains	"Good day ! "
file PVOC-D.voc contains	"Welcome to the show. "
file PVOC-E.voc contains	"I'm a talking parrot. "
file PVOC-F.voc contains	"Please talk to me. "
file PVOC-G.voc contains	"Nice to see you. "
file PVOC-H.voc contains	"Please say something. "
file PVOC-I.voc contains	"Have a nice day. "
file PVOC-J.voc contains	"Goodbye. "

Parrot will say PVOC-A, PVOC-E, PVOC-D as the start-up greeting messages. When you quit, PARROT will say PVOC-J and PVOC-I.

The next 5 voice files are reply messages. PARROT will randomly refuse to play back the recorded voice and send out one of these 5 voices instead.

file PVOC-K.voc contains	"Oh ! You sound terrible ! "
file PVOC-L.voc contains	"Yak ! You have bad breath ! "
file PVOC-M.voc contains	"What are you saying ? "
file PVOC-N.voc contains	"What are you saying(angrily) "
file PVOC-O.voc contains	"Don't talk nonsense "

The last 6 voice files are keyboard reaction messages. When the keyboard is pressed, PARROT will randomly send out one of these messages :

file PVOC-P.voc contains	"Ouch ! "
file PVOC-Q.voc contains	"Ooo..h ! "
file PVOC-R.voc contains	"Don't touch me ! "
file PVOC-S.voc contains	"Go away ! "
file PVOC-T.voc contains	"Hee..Hee...Hee "
file PVOC-U.voc contains	"Herr..Herr..Herr "

MAKEPV.EXE

MAKEPV.EXE is used to create PARROTV.VCB using the 21 voice files shown above.

The program checks for the existence of PARROTV.VCB and ask your permission to overwrite it. Make sure that you are working on the hard disk or on a backup copy of PARROT.

eg.

> **MAKEPV**

will generate PARROTV.VCB in the current directory with sources taken from PVOC-A.VOC PVOC-U.VOC in current drive.

After this, copy PARROT.VCB into your PARROT sub-directory. Together with a new set of Parrot pictures, you can now have your own customized parrot.

6 SBTALKER - Text-to-Speech Synthesizer

SOUND BLASTER comes with a text-to-speech synthesizer module - SBTALKER.

SBTALKER.EXE is a memory resident module that will try to read any kind of ASCII text supplied to it. It has an unlimited vocabulary.

Currently, 2 application programs are included with SBTALKER:

1) SAY.EXE	- a program to read ASCII text and text files
2) SBAITSO.EXE	- a fun program that will attempt to converse with you in English.

Both of these programs require SBTALKER to be resident in memory before they can be executed.

6.1 Activating SBTALKER

SBTALKER.EXE is found in the \SB\SBTALKER sub-directory. Since it is a memory resident program, you should only execute it once.

To activate SBTALKER, type SBTALK:

eg.

> **SBTALK**

After this you can run SAY.EXE or SBAITSO.EXE.

6.2 Removing SBTALKER

SBTALKER is quite a large program. If it stays resident in memory, some of your other applications that requires more memory may not run. You may use the REMOVE.EXE program in the SBTALKER sub-directory to remove SBTALKER from memory.

Just type :

>**REMOVE**

To effectively remove SBTALKER, it must be the last program that is loaded into memory.

6.3 Running SBTALKER on EMS

SBTALKER will automatically load itself into the EMS memory if you have the proper EMS driver installed in your system. SBTALKER is compatible with most EMS drivers in the market. However, if you have one that doesn't work properly with SBTALKER, you may have to remove this EMS driver in order to run SBTALKER.

6.4 SAY.EXE

SAY.EXE is a program that can read ASCII text or text files from the command line. It will operate only if SBTALKER.EXE is loaded.

Format : **SAY ["any text"] [text-file]**

Note : A space is required immediately after the word 'SAY' and after each item to be spoken.

"any text" : any ASCII, text to be spoken; may be placed within the two quotes

text-file : is the name of the text file to be spoken

You may combine several files and direct text to form a complete message.

eg.

SAY "HELLO" SBTEST.TXT "THANK YOU"

6.5 DR SBAITSO - Your Personal Consultant

DR SBAITSO is a program that seems to act intelligently by responding to your queries and pretending to solve your personal problems.

You may ask DR SBAITSO any kind of questions, tell him about all your problems and see how DR SBAITSO attempts to solve them by replying to you in a synthesized voice.

Quick Start

So, without reading further, you might want to start DR SBAITSO. You may do so by running the batch file SBAITSO:

> **SBAITSO**

You will enjoy DR SBAITSO more if you try to find ways to make DR SBAITSO understand you more clearly. Try it, you will be surprised how intelligent your computer has become.

You may ask him any kind of questions. He will try his best to satisfy you. He performs best when you talk about your problems and in complete sentences.

Exploring DR SBAITSO

Once you are in the program, you may enter anything you like and see how DR SBAITSO reacts to your input. I won't want to spoil your fun by telling you too much about what DR SBAITSO can do. The bulk of the fun is for you to explore DR SBAITSO yourself.

After a while, you might want to know that you can ask DR SBAITSO to repeat what he had said by just entering "R".

Make the conversation more interesting by using the .ECHO ON command. This will make SBTALKER echo what you have entered using another voice.

DR SBAITSO can also perform some simple mathematics.

Dot Commands

There are some Dot commands that DR SBAITSO can accept. These Dot commands are preceded with a dot in the first column.

They are :

.QUIT	- to quit this program."
.READ filename	- filename is the name of the text file to be read
.TONE t	- where t is a digit of 0 or 1 0= Bass tone and 1=Treble tone
.VOLUME v	- where v is a digit from 0 - 9 0 for lowest volume
.PITCH p	- where p is a digit from 0 - 9 0 for lowest pitch
.SPEED s	- where s is a digit from 0 - 9 0 for lowest speed
.PARAM tvps	- where tvps are 4 digits representing: Tone/Volume/Pitch/Speed"
.ECHO ON or OFF	- ECHO ON will read out what you typed in

If you are not getting much from DR SBAITSO, try to ask him for HELP.

7 VOXKIT - A Voice Toolkit Software

The VOXKIT is a set of voice toolkit software which allows you to assemble your own voice files. Recording and playback of sound can be from the memory or directly from the disks. This means that you can record very large files up to the capacity of your hard disk.

You may record and digitize any kind of sound from the real world using a simple microphone. Compress it to the desired size for use in your own program.

The following programs are found in the VOXKIT disk :

- 1) VOXKIT.EXE - the main voice kit program
- 2) VOC-HDR.EXE - program to add headers to raw voice files
- 3) JOINTVOC.EXE - program to join voice files together
- 4) VREC.EXE - to record voice into disk at command line
- 5) VPLAY.EXE - to play back voice from disk at command line

7.1 VOXKIT.EXE

The VOXKIT.EXE is a program that allows you to record and play back digitized sound from the Sound Blaster. It calls the CT-VOICE.DRV to perform all the voice functions.

You may also write your own programs to call the CT-VOICE.DRV. The voice functions available in CT-VOICE.DRV are described in the "Software Developer Kit". The voice files are saved using the Creative Voice File Format which is also described in the "Software Developer Kit" (available separately)

Format : **VOXKIT [/Bkk]**

/Bkk : specifies the buffer size used for the disk recording and playback processes.

Two buffers are used. "kk" is the size of the buffer in 2K per unit.

If this is not specified, a default value of 16 is assumed for "kk". That is, 32K bytes for each of the buffers.

The range for "kk" is from 1 to 32.

Recording to Diskettes and Buffer size

As diskette drives are slow, the following care should be taken when recording or playing back on diskettes, or else discontinuation of the recording or playing might occur :

- 1) Use a larger size buffer by specifying /B32
- 2) The diskette for recording should be newly formatted, so that its directory is not messy and thus allowing higher access speed.

7.2 Using VOXKIT

Type : > **VOXKIT**
to run this program

You will see the following menu:

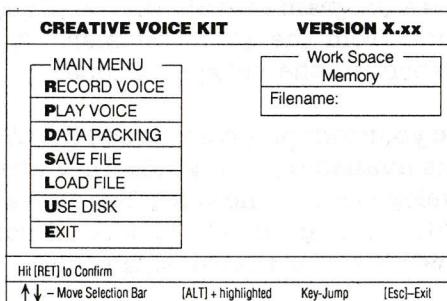


Figure 10

When you first enter VOXKIT, the program defaults to the use of memory as a workspace for voice recording and play back. You may use the disk directly as workspace by selecting the "USE DISK" function as described below.

Use the Cursor keys to move the cursor to the desired function and hit <Enter> to select it. The following is a description of each of the functions in the menu.

1) RECORD VOICE

This function allows you to record a voice from the microphone input. You must plug a microphone into the microphone jack on the back of the Sound Blaster.

The default sampling rate is 8000Hz, you may change this sampling rate from 5000 Hz to 12000 Hz. The Hz is the number of samples you wish to take per second.

At 8000 Hz, you will be taking 8000 one-byte samples. Hence the data rate will be 8000 bytes of memory consumed for one second of recorded sound. This sampling rate is good for a female voice. For a male voice, you may use a lower sampling rate of 6000Hz to conserve memory.

The higher the sampling rate, the better the quality of the recorded voice.

When you are recording to memory, you must save the voice to disk after you have found it satisfactory. If you are recording directly to the disk, you will have to supply a filename before recording.

2) PLAY VOICE

This function allows you to play back the voice you have just recorded or loaded from disk.

It is able to select the correct sampling rate, compression format etc, from the information provided in the file header.

3) DATA PACKING

This function allows you to pack your recorded data using the scheme you desire. Three data compression schemes are offered here :

- a) 4 bit ADPCM — gives a 2 to 1 compression. Using this compression scheme, you hardly hear any degradation in quality. It is the scheme that is most recommended.
- b) 2.6 bit ADPCM — gives a 3 to 1 compression. Quality is slightly affected when using this compression.
- c) 2 bit ADPCM — gives a 4 to 1 data compression. Quality is significantly affected using this scheme. It is recommended for use in situations where memory conserving is most important, or where noise is part of the sampled sound - such as an explosion, thunder, gun shots, etc.
- d) Silence Packing — this function replaces long durations of silence with a few bytes, thereby saving memory with no loss of quality.

It is important that Silence Packing is performed before any ADPCM compression is performed. After ADPCM is performed, you cannot pack silence anymore nor can you further pack the data.

If you have recorded good data and you want to try different packing schemes, it is recommended that you save the original data before packing it. You may load the original data again to try other packing schemes.

4) SAVE FILE

This function saves the recorded or packed file in memory on a disk file. You must provide a filename without the extension. The default extension for all voice files is ".VOC".

This function is not available when you are using disk as a work space.

5) LOAD FILE

This function loads a voice file from the current directory. A window shows all the .VOC files in the current directory. You may use the cursor keys to move to the desired file and hit <Enter> to select it for loading.

You may select other sub-directories by moving the cursor to the filename of the sub-directory and hitting [Enter]. You may also move to a higher directory by selecting the " .. " file.

All .VOC files must be saved in the Creative File Format to be loadable. If you have a raw voice file which you want to compress, you will have to use the VOC-HDR.EXE program to add a header to it before VOXKIT is able to load this file.

After a file is loaded, you may use PLAY VOICE to play it back or use DATA PACKING to pack it.

This function is not available when you are using the disk as a work space.

6) USE DISK/MEMORY

Select this function to toggle between the use of disk or memory as the work space.

7.3 VOC-HDR.EXE

This program in the VOXKIT sub-directory allows you to add the CT-VOICE HEADER to a sound file recorded from other sources.

With this header added, VOXKIT.EXE will be able to play the sound file.

usage : **VOC-HDR source-file target-file**

7.4 JOINTVOC.EXE

This program is used for joining two or more voice files together.

Usage:

JOINTVOC /Ttarget-filename [voice-file /Saa /Mbb /Rcc /RE]...

where:

- aa is the silence period to add in units of 0.1 sec
- bb is the marker to add
- /Rcc is the start repeat block where cc is the number of tones to repeat.
- cc = -1 indicates non-stop
- /RE is the end repeat

/S, /M, /R, /RE are parameters which you may add between files.

aa, bb & cc are decimal values not greater than 32767.

/Saa parameter lets you add a silence period between files, the unit of dd is in 0.1 second.

/Mbb parameter allows you to add a marker designated by bb in between files. During playback of the voice, if the marker is encountered, it will be sent to a 2-byte flag. The application program can then decide how to act when these flags are encountered.

/Rcc and /RE signify the start and the end of repeat blocks. The voices to be repeated are within the /Rcc and /RE parameters. The number of times to repeat are specified by cc.

eg. to add 3 voice-files into TARGET.VOC :

JOINTVOC /Ttarget.voc file1.voc file2.voc file3.voc

If you want to play file2.voc 5 times, then pause for 2 seconds after playing file2.voc, the command is :

JOINTVOC /Ttarget.voc file1.voc /R5 file2.voc /RE /S20 file3.voc

7.5 VREC.EXE

This program allows you to record a voice from the DOS command line. The voice is recorded directly onto the diskette or hard disk using a double buffering technique. The length of the recorded voice file is limited only by the disk capacity.

Format:

VREC voice-filename [/Bkk] [/Pii] [/Q] [/S] [/Tss] [/Fss]

(the items enclosed in [] are optional parameters)

voice-filename : specifies the filename to store the recorded voice. The default extension is ".VOC". The voice is stored in the Creative Voice File format.

/Bkk : specifies the buffer size used for recording. The program uses two buffers during the recording process. "kk" is the size of the buffer in 2K per unit.

If this is not specified, a default value of 16 is assumed for "kk". That is, 32K bytes for each of the buffers.

The range for "kk" is from 1 to 32.

/Pii : specifies the Sound Blaster I/O port address, if it is different from the factory default setting of 220.

"ii" must be one of the following I/O addresses:

210, 220, 230, 240, 250 and 260

/Q : specifies the Quiet screen mode operation. When specified, except for error messages, all other messages are suppressed.

/S : specifies a direct DOS shell operation after the voice process is activated.

/Tss : specifies the duration of the recording process. The unit for "ss" is number of seconds. (Note: This function will not work when /S switch is specified.)

The range for "ss" is from 1 to 65535, giving a maximum recording time of about 18.20 hours.

/Fss : specifies the recording sampling rate (frequency). The valid range is 4000Hz to 12000Hz

7.6 VPLAY.EXE

This program allows you to play back a voice file from the DOS command line. The voice file could be any size as recorded by VREC or VOXKIT.

Format:

VPLAY voice-filename [**/Bkk**] [**/Pii**] [**/Q**] [**/S="prg"**] [**/Tss**]

(the items enclosed in [] are optional parameters)

voice-filename : specifies the voice file to play back. The default extension is ".VOC". The voice file must be in the Creative Voice File format.

/Bkk : specifies the buffer size used for playing back. "kk" is the size of the buffer in 2K per unit.

If this is not specified, a default value of 16 is assumed for "kk". That is, 32K bytes for each of the buffers.

The range for "kk" is from 1 to 32.

/Pii : specifies the Sound Blaster I/O port address, if it is different from the factory default setting of 220.

"ii" must be one of the following I/O addresses:

210, 220, 230, 240, 250 and 260

/Q : specifies the Quiet screen mode operation. When specified, except for error messages, all other messages are suppressed.

/S="prg" : shell to DOS to execute another program after the voice is played.

prg is the program or DOS command to be executed. It can have up to 16 parameters.

/Tss : specifies the duration of the playing process. The unit for "ss" is number of seconds. (Note: This function will not work when /S switch is specified.)

8 FM Intelligent Organ

A most exciting break-through in music technology, the FM Intelligent Organ converts a PC into an organ of incredible power.

Intelligent Play - simply play on the PC keyboard (use one finger if you wish) and the software will add accompaniments (bass, chord and rhythm) in real time! Very complex and rich musical pieces can be produced with very little effort.

Learn Mode - learn to play this powerful organ even if you are an absolute beginner. You will be playing great sounding music in minutes without having to learn any music theory.

8.1 I/O Port Address Installation

(*You may skip this section if your Intelligent Organ is already playing music.*)

If you have changed your I/O address jumper from the default 220H to another location, you need to install the ORGAN.DRV in order to run this program.

To install the new I/O address on the ORGAN.DRV, use INST-DRV.EXE program as described in the section in INSTALLATION NOTES - "Installing Sound Drivers".

8.2 Time for Some Action

The FM Intelligent Organ is found in the \FMORGAN\ sub-directory.

Type : > **FMORGAN**

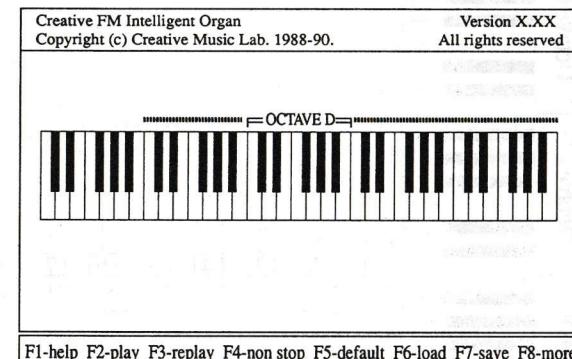


Figure 2 Intelligent Organ Main Menu

After the *clrrr* and *whrrr*, you should see the above picture on your monitor. This is the main menu of your Intelligent Organ. If you don't see the main menu on your screen, you should go through the installation once more.

HELP MODE

Hit **[F1]** on your function key pad and you will be given a brief summary of the Intelligent Organ's functions. The adventurous can literally put aside this manual for awhile and begin the exploration of this Intelligent Organ.

As a tip, there is a song provided in your Intelligent Organ disk called **DEMO**. Feel free to load it in for replay, non-stop replay with all kinds of effects; changing instruments, accompaniments, tempo, etc. Go on and have a good time — you can't damage anything by playing the organ, and the **HELP** menu is always there to guide you.

PLAY MODE

Before you start to key in anything, you need to know which keys to play.

Figure 3 gives you a good picture of the PC keyboard representation of the normal piano keys.

SEVEN OCTAVE PIANO KEYBOARD ON YOUR PC

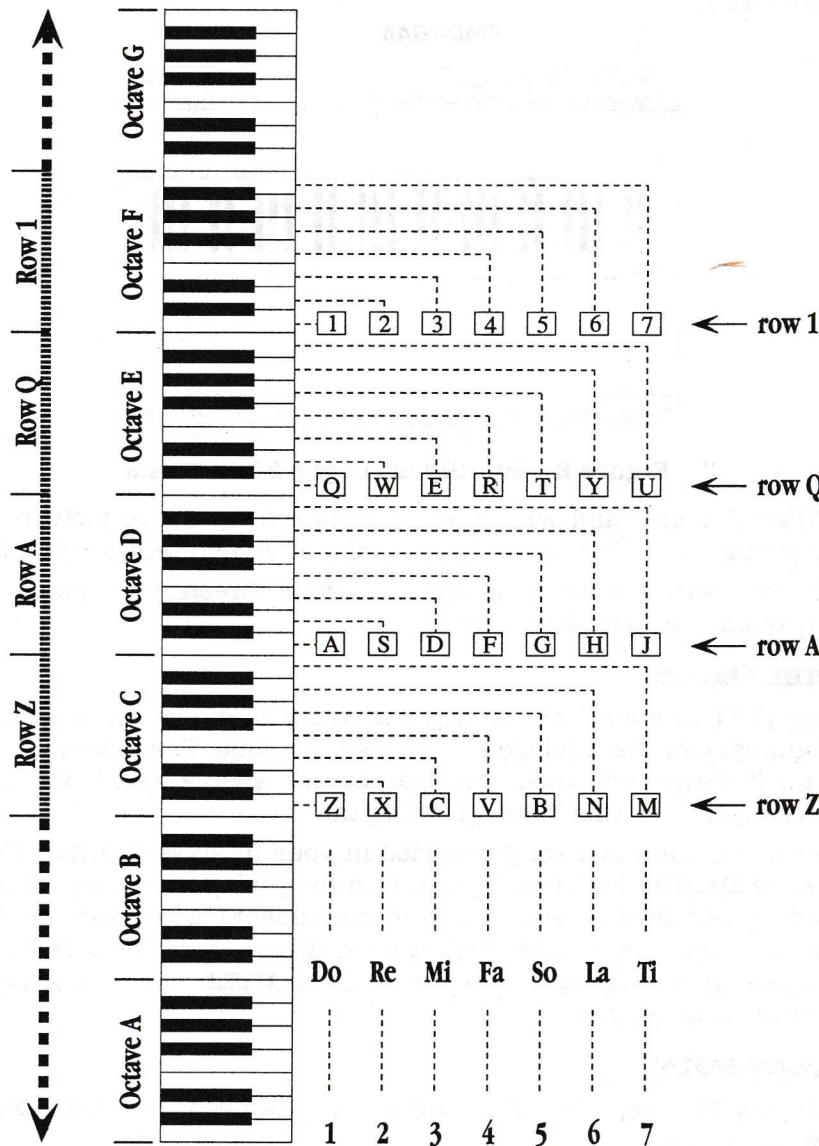


Figure 3

SOME KEYBOARD TERMINOLOGY.

All keys of keyboard instruments are arranged in groups of 12 keys (5 black & 7 white keys). Each of this group is called an Octave and the 1st white key of each Octave is a "DO", the second white key "RE", the third "MI" followed by "FA", "SO", "LA", "TI".

The Middle C is the "DO" note located at the middle of a piano keyboard and in the case of the Intelligent Organ, it is the "DO" note of the D Octave. This Organ program has a very large keyboard — the equivalent of a large organ keyboard. There are 7 Octaves available and for convenience, we named them as Octave A, B, C, D, E, F and G.

GETTING TO KNOW YOUR KEYBOARD.

At the main menu, hit the [F2] function key to enter play mode.

Press the \leftarrow or \rightarrow keys on the numeric keypad to shift the green color bar above the organ keyboard. Notice that the position of the D-Octave is always indicated. If you observe carefully, you will also notice that the length of the moving green bar always covers 4 octaves. These four octaves represent the four rows of keys on your PC keyboard, namely row 1, row Q, row A, row Z, used for playing the organ.

For example, if the D-Octave is at the left hand side of the green bar, it means that the row Z represents the D-Octave. On the other hand, if the D-Octave is shifted to the right hand side of the green bar, then row 1 represents the D-Octave.

Have you pressed [F2] yet? Go ahead, press [F2] and start messing around with those "piano keys".

Try playing any of these keys on your PC and you should hear the corresponding notes. If you cannot hear any sound, please check the volume control on your sound card and refer to Appendix C: QUICK REFERENCE FOR PROBLEM SOLVING.

You can actually go on playing (or messing around) for hours, but let us stop for a while so that you can "show off" your musical talent by getting a bit more sophisticated. (and I'll "show off" what this organ can do for you).

For those of you who don't seem to be able to find something to play, you can try one of my favorite tunes on the next page.

Play by typing the keys corresponding to the number on the notes.

E.g. The first 7 notes are (1 1 5 5 6 6 5)

You can use any of the 4 octaves, that is any of the 4 rows to play.

If you chose row "1", type: 1 1 5 5 6 6 5
If you chose row "Q", type: Q Q T T Y Y T

After you have played the whole song, let's try playing it differently one more time. This time hit the space-bar first and start playing when the number counting on the top-left corner is **1**. You will hear beautiful background music being added to what you are playing.

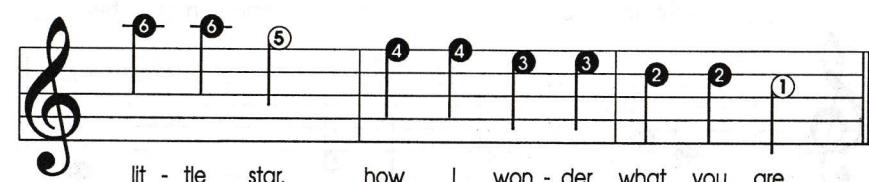
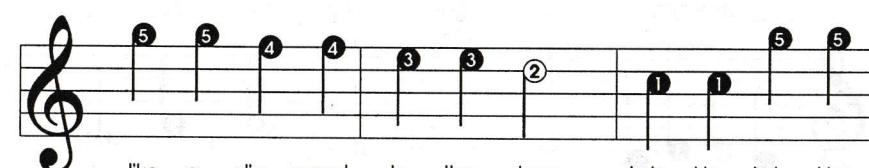
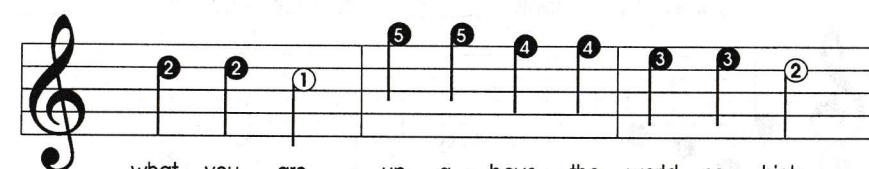
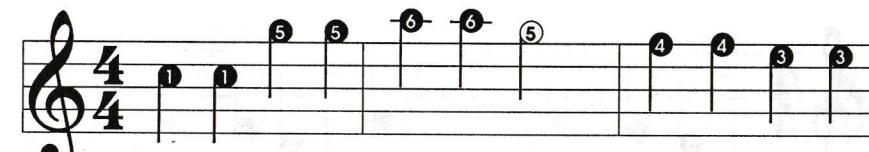
Press [ESC] to quit PLAY mode after playing the song.

TWINKLE, TWINKLE, LITTLE STAR

(filename:TWINKLE)

KEY 1=C

Rhythm = March



WHEN THE SAINTS GO MARCHING IN

(filename: SAINTS)

KEY 1=C

Rhythm = March

Treble clef, 4/4 time. Fingerings: 1, 3, 4, 5, 1, 3, 4, 5. Lyrics: Oh, when the saints go marching in, _____.

Treble clef, 4/4 time. Fingerings: 1, 3, 4, 5, 3, 1, 3, 2, 3. Lyrics: Oh, when the saints go march - ing in, _____.

Treble clef, 4/4 time. Fingerings: 3, 3, 2, 1, 3, 5, 5, 4. Lyrics: I want to be in that num - ber _____.

Treble clef, 4/4 time. Fingerings: 4, 3, 4, 5, 3, 1, 2, 1. Lyrics: when the saints go march - ing in _____.

8.3 Save, Load & Replay

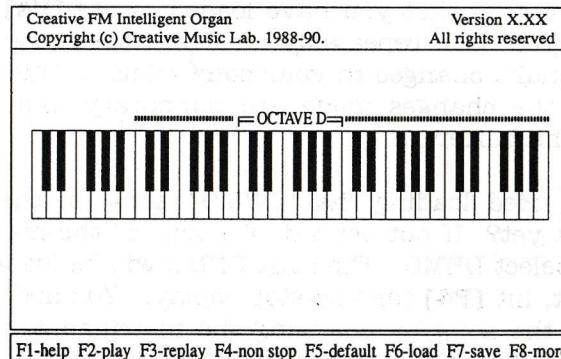


Figure 4 Intelligent Organ Main Menu

SAVINGS

Wonderful, isn't it?! Since this is your first song on the Organ, I am sure you would like to save it to show your friends. Press function key **[F7]** and you will be prompted to key in the name of the song.

Type "MYSONG1" and press [Enter] and the song that you've just played will be saved onto the disk. The Intelligent Organ actually "remembers" the song you are playing by storing it temporarily in a reserved memory area in your computer. We call this area the "BUFFER" and during a 'SAVE' operation, the contents in the buffer is transferred onto the disk.

Perhaps you would like to play the song again before you save.
Hit **[F2]** to play again. Then press **[Esc]** to quit; and use **[F7]**
to save the song.

LOAD

Just to make sure that you have saved your song correctly, press **[F2]** to go to the PLAY mode and then press the **[Esc]** key to return to the main menu — going to the PLAY mode will wipe out the song that is stored in the buffer. Now press **[F6]** to load back the song that you have just saved.

A pop up menu containing all the song titles on your disk will be displayed. Simply move the cursor to the song you want and hit [Enter]. That song will be loaded into memory.

NON-STOP REPLAY

To hear the song that you have loaded, press **[F4]**. The song will be played back repeatedly until you press the **[Esc]** key. You may make changes to your song while in this "non-stop" mode but the changes made are temporary and will not be saved in the buffer.

Have you tried loading the "DEMO" song on the Intelligent Organ disk yet? If not, let's do it now. At the main menu hit **[F6]** and select DEMO. The song DEMO will be loaded from the disk. Next, hit **[F4]** for non-stop replay. You are now invited to modify the song by changing the instrument, rhythm etc. Isn't it fun? Go on, the power is with you, turn the song upside down.

Try loading other songs for a non-stop replay. Have fun with them.

To make "permanent" changes you will have to press **[F3]** to replay. In this mode, the song will only be replayed once and to hear the song again, you will have to press **[F3]** once more. Changes made in this 'replay' mode are stored in the buffer and is therefore permanent. To avoid changing the DEMO song permanently, enter a different song title such as "DEMO2" when a filename is asked for during saving.

8.4 Instruments and Accompaniments

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Version X.XX
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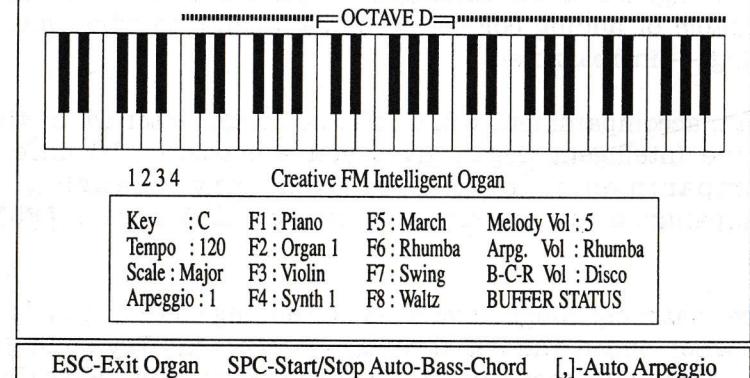


Figure 5 Intelligent Organ Play Menu

INSTRUMENTS

Press **[F2]** to get to PLAY mode. Notice the menu in the PLAY mode? Try pressing function keys **[F1]** to **[F4]** and what do you notice? Some words in the main menu begin to change color or in the case of a monochrome monitor, highlighted.

Go on, choose something and start to play your tune. You can change instruments any time you fancy — simply press any of the keys **[F1]** to **[F4]**.

Each function key actually supports 5 instruments giving a total of 20 instruments. Pressing a function key continuously allows you to switch among the 5 instruments.

AUTO-BASS-CHORD

Playing a simple tune is not so difficult after all, but most tunes you've heard are not simple. They normally come with some background sound which is what we call accompaniment. The accompaniment enriches the quality (in most cases) of the main melody by adding bass, chord and rhythms to it.

Bored? For some action simply press the space bar and the accompaniment will be turned on. To stop, press the space bar once more.

The intelligence of the Intelligent Organ lies in the fact that it is capable of adding correct accompaniments to what you are playing — in realtime!

Certain accompaniment will suit some songs better than others and the Intelligent Organ gives you a choice of 16 different accompaniments to choose from. Try changing the accompaniment by pressing any of the function keys [**F5**] to [**F8**].

Notice that most songs have a proper ending so that they sound right when ended and not abruptly interrupted. Try ending the auto accompaniment for various types of Auto-Bass-Chord accompaniment by hitting [**Enter**] key.

Now, with more power at your finger tips, you are ready to take on the "Twinkle, Twinkle, Little Star" again and mesmerize your audience with a vastly sophisticated version. Choose an instrument you like and select "March" for your Auto-Bass-Chord accompaniment. Don't forget to give your song a proper ending before saving it. Name it MYSONG2.

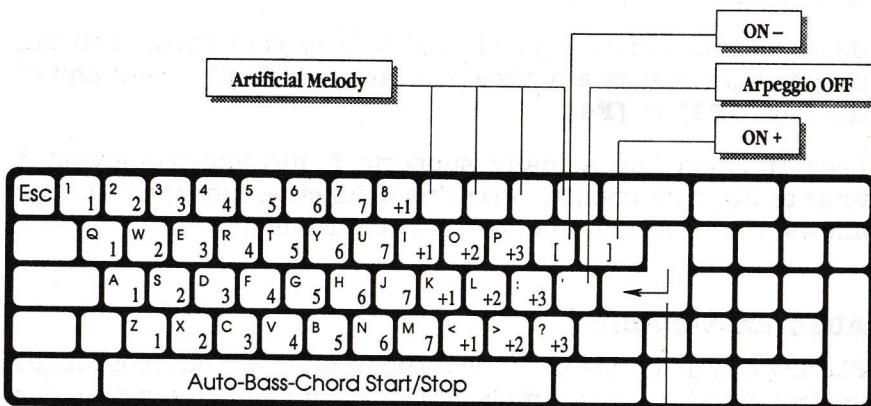


Figure 6
**Keys for Auto-Bass-Chord, Auto-Arpeggio
and Artificial Melody.**

AUTO ARPEGGIO

Ready for more fun now? In addition to the Auto-Bass-Chord accompaniment, the Intelligent Organ gives a further enhancement to your songs by providing an Auto Arpeggio — automatically adding a built-in harmonious melody to accompany your main melody. You can select any one of the six arpeggios using the [1] and [2] keys. How about adding more spice to MYSONG2 using your new found friend. That's a good way to get to know them better.

Use the [,] to stop the Auto-Arpeggio.

ARTIFICIAL MELODY

Instead of the Auto-Arpeggio, you can also add a string of melodies to what you are playing. This artificial melody is provided by the following four keys:

[**9**], [**0**], [**-**] and [**=**]

The best effect is achieved by pressing one of the artificial melody keys during the long notes of your song.

E.g.

Press [**9**] to get a trill on the last note you play.

8.5 Tempo & Volume Control

TEMPO

You might have noticed the jumping numbers at the top left hand corner of your PLAY menu. The numbers are actually the beat count provided by the Intelligent Organ to assist you in getting your tempo correct. You can vary the tempo by pressing:

[Ins] — Increase Speed
[Del] — Decrease Speed



Figure 7
"PIANO KEYS" equivalent on a PC Keyboard

If you are still struggling to get your song right, because you cannot keep up with the pace of the song, don't despair. Simply decrease the tempo until you can key in your song comfortably. Add Auto-Bass-Chord and Arpeggio and you still get to your sophisticated piece somehow. You can then increase your tempo gradually as your skill gets better. (Let me show a "crooked way" — play your song in a slow tempo and replay it in a regular tempo).

VOLUME CONTROL

Besides the master volume control on the Music Card itself, the Intelligent Organ has 3 individually adjustable volume controls for the Melody, the Auto-Bass-Chord and the Auto Arpeggio. You could adjust them individually to get the best sound effect for your songs.

Now for some serious advice: Spend some time to master one song. If you can master one, you can master them all.

However, when you want to know more about other functions available on your organ, you can refer to the next two chapters.

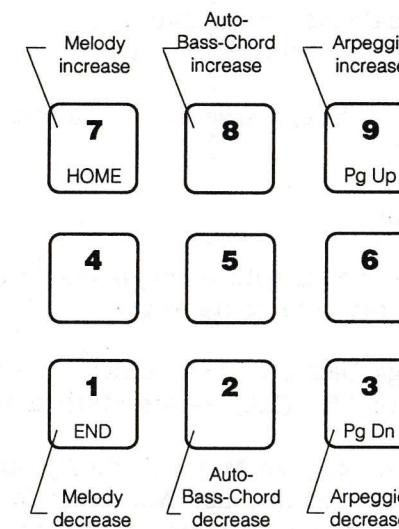


Figure 8
Volume Control

8.6 Time Signatures, Scale & Keys

TIME SIGNATURES

At the beginning of a musical score, there is always a Time Signature. The most common being:

$\frac{3}{4}$ and $\frac{4}{4}$ which denote 3 beats and 4 beats respectively.

For songs with $\frac{3}{4}$ Time signature, you should use only the waltz-type rhythms found on [F8].

MAJOR / MINOR SCALE SELECT:

[F9] — Major Scale Accompaniments
[F10] — Minor Scale Accompaniments

Most songs can be categorized as a major-scaled song or a minor-scaled song.

As a rule of thumb:

Major-scaled songs begin with a major chord or end with "1" (DO) — the first note of its key.

Minor-scaled songs begin with a minor chord (Eg. Am, Em, Dm,...) or end with "6" (LA) — the sixth note of its key.

For major-scaled songs, use Major Scale Accompaniment [F9], and for minor-scaled songs, use Minor Scale Accompaniment [F10], so that the accompaniments sound proper.

Generally speaking, we use [F9] major accompaniment unless the songs ends with "6" (LA) or begins with a minor chord. Only then we choose [F10] minor accompaniment.

TRANSPOSING

Not every song is written in C key (1=C) — i.e. C is the "DO" note. Some tunes sound better if they are played in a higher key while others sound better in a lower key. Moving your "DO", "RE", "MI", etc to a higher or lower tone is called TRANSPOSING. The Intelligent Organ gives you a very convenient one touch way of transposing:

On the numeric key pad, press

[+] Transpose music one-semitone up
[-] Transpose music one-semitone down
[shift] [+] Transpose a perfect fourth
[shift] [-] Transpose a perfect fifth

To hear the effect of transposing go to the main menu and press [F6] to load in a song. Next press [F4] for a non-stop replay and, while the song is being played, press the [+], [-], [Shift] [+] and [Shift] [-].

OCTAVE CHANGING

There are 7 Octaves playable from the Music Card and 4 Octaves are directly accessible at any time from your PC keyboard. You can gain access to all seven by using the [←] and [→] keys on the numeric key pad to shift to the rest of the octaves.

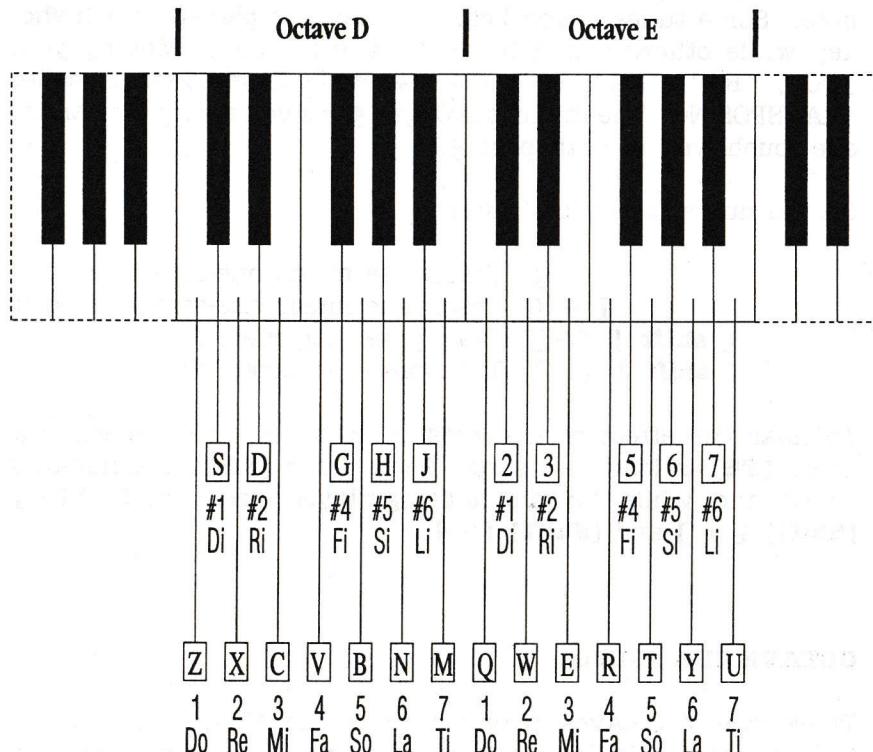


Figure 9
Small Keyboard Layout

BIG & SMALL KEYBOARDS — BLACK KEYS

Besides the 4 Octaves keyboard, the Intelligent Organ also provides users with a small keyboard with directly accessible "Black Keys". Those who would like to play the "Black" Keys directly can hit the [Tab ↩] key to toggle to a small keyboard (see fig. 9) with only 2 octaves.

The 4 rows hence becomes:

Row 1 — Black keys	(Octave E)
Row Q — White keys	(Octave E)
Row A — Black keys	(Octave D)
Row Z — White keys	(Octave D)

If the black keys are accidentals which occur rarely in your songs, you can play the black keys on the big keyboard by holding [**Shift**] down while playing.

BUFFER STATUS

The song you played is stored automatically in a memory buffer. The size of this buffer is 64 K bytes.

Under normal conditions, the word "Buffer Status" appearing on the bottom right corner is blue in color. When the buffer is almost full, it will flash in red color. When the buffer is full, it will appear as red.

When the buffer is full, you can carry on playing, except that what you play subsequently will not be stored in the buffer.

When you activate [**F7**] — SAVE, the contents of the buffer are saved on the disk. When you load a song from the disk, the song is loaded into the buffer.

8.7 Default Settings & Other Functions

DEFAULT SETTINGS F5

The defaults for functions like instruments, rhythm styles, speed, title of songs, etc. can be set by pressing **[F5]** from the main menu. When in the Default Setting mode, you can use the **↑** & **↓** to select the function. Alternatively you can jump to that function by pressing the highlighted character. Next use the **←** or **→** to rotate the various options available in that function. Stop at the option you want.

To enter the title of the song you must hit **[T]** and then type not more than 24 characters. After having set all the default settings you desire, hit **[Enter]** to end.

Hit **[Esc]** if you wish to abort all changes to the setting and quit.

Hit **[O]** to restore all values to factory settings.

It is important to set your default settings because:

1. You will be able to change your instruments, accompaniments, etc. to what you want with one touch of a button.
2. The default setting is saved together with the songs.
3. You can change the default settings after you have played a song or loaded a song.

MORE FUNCTIONS F8

When you hit **[F8]** in the main menu you will be offered with more functions:

F1 - LEARN

- This function allows you to learn an organ song that is loaded in the memory buffer.

F2 - PATH

- Allows you to set the directory path for SAVE & LOAD.

F3 - SHELL

- Allows you to SHELL to DOS temporarily;
eg. to perform a DIR command.
Type EXIT to return to ORGAN

F4 - QUIT

- Quit the Organ and return to DOS

F5 - MIDI TOGGLE

- Enter or exit MIDI mode

8.8 More on LEARN MODE

The learn mode **[F8]** + **[F1]** is a very easy way to learn to play any organ song without having to know any music theory. It shows you how the notes of the song are to be "typed" on the actual PC keyboard.

First load a song that you like to learn using the **[F6]** (load) Function.

Then hit **[F8]** and **[F1]** to enter the Learn mode.

Hit **[F1]** (demo) again to see a demonstration of how the keys should be "typed".

Then hit **[F2]** (learn). You will first see a brown bar on the upper half of a key. This is the warning signal for you to get ready to hit this key. When the bar turns into purple and drops to the bottom half of the key, this is the exact time that you must hit the key. If you do not hit the key in time, the song will wait, until you hit the correct key.

By practicing on a song repeatedly, you should be able to play it without assistance after a while. If you have never played a musical instrument before, try it now, this will be really exciting.

8.9 MIDI Mode

The FM Intelligent Organ supports the MIDI interface of the SOUND BLASTER Card. You may play the FM Intelligent Organ using a normal organ keyboard. You could play with one hand, and have the Intelligent Organ add the accompaniments for you.

This is what you need to do :

1. You need to get an electronic organ keyboard (or synthesizer) that has a MIDI interface plus the optional MIDI Connector Box for SOUND BLASTER (cables are supplied with the MIDI Box).
2. Connect the MIDI Connector Box to the Joystick Connector on the SOUND BLASTER.
3. Plug the MIDI cable from the MIDI-IN on the MIDI Box to the MIDI-OUT on the MIDI keyboard.
4. Switch on the MIDI keyboard, and set it to MIDI mode. (Refer to the keyboard manual if you don't know how to do it.)
5. Next, run the INTELLIGENT ORGAN software.
6. Hit Function Key **[F8]-more** then **[F5]-midi-toggle**. This will activate the MIDI mode of the FM Intelligent Organ and enable it to receive MIDI codes from MIDI keyboards. You can still use the PC keyboard to play notes and change the ORGAN functions.
7. Next, you will see a "MIDI MODE" window on the screen. You are supposed to select the key signature that you are going to play. This is necessary so that the ORGAN can add the correct accompaniments to your song.

Use the 4 arrows keys to change to the desired key signature. If you are not sure, count the number of sharps or flats in the key signature of your music score. Match the number of sharps or flats with those on the windows.

up arrow — incr no. of sharps or decr no. of flats
down arrow — decr no. of sharps or incr no. of flats
left arrow — lower a semitone
right arrow — raise a semitone

When you've selected the desired key signature, hit [Enter] and you will return to the main menu. The MIDI mode is now turned ON.

8. Hit **[F2]** to play. You can now play on the MIDI keyboard as well. The use of the MIDI keyboard will not hamper the functions of the FM Intelligent Organ. Change of instruments, rhythms, tempo, keys, etc. can still be executed using the PC's keyboard.
9. If your song changes key signature midway through the song, you must also let ORGAN know. Use the transpose functions - Shift **[+]** or Shift **[-]** on the numeric keypad to match the key signature on the screen with that you are playing.
10. When you save a song after you have played on the MIDI keyboard, you may play back the song like any other ORGAN song played on the PC's keyboard. You will not hear the tunes from the MIDI keyboard. MIDI-OUT to the MIDI keyboard is not implemented.
11. The song that you have saved has been transposed to its "natural key signature":— the key signature whereby the song may be played without any black keys. During playback, ORGAN transposes it back to the original key signature. This has the advantage, that your song could be easily "LEARN"ed by others.
12. To end the MIDI-MODE, hit **[F8]** and **[F5]** one more time.

9 Appendix A

General Specifications

9.1 SOUND CAPABILITIES

- **11 voices of FM music** (AdLib* compatible)
Frequency Modulation sound generation for realistic sounds
Two modes: 9 sounds or 6 melody sounds and 5 rhythm sounds supported by numerous games and entertainment software
- **1 Digitized voice channel (DAC)**
provide output of sound sampled from the real world - speech, special effects, animal sounds, thunderstorm.
 - * programmable variable sampling rate 4KHz to 23KHz
 - DAC Transfer modes :
 - * Direct mode - direct single byte transfer by CPU
 - * DMA mode - No CPU intervention/overhead required
 - * compression schemes :
 - 8 bit data , no compression
 - 2 to 1 data compression: 4bit ADPCM, hardware decompression
 - 3 to 1 data compression: 2.6bit ADPCM, hardware decompression
 - 4 to 1 data compression: 2bit ADPCM, hardware decompression
- **built-in stereo power amplifier**
Max output : 4 watts per channel, 4 ohms stereo outputs stereo headset connector, drives any kind of speakers, portable speakers or headsets directly.
- **RCA-plug conversion cable included**
for connecting to home stereo
- **built-in volume control**

(*AdLib is a registered trademark of AdLib Inc.)

9.2 VOICE INPUT (DIGITAL SAMPLING) CAPABILITY

- **8 bit A-D conversion of sound signal**

*variable sampling rate : 4KHz to 12KHz

ADC transfer modes:.

*Direct mode

*DMA mode — no CPU intervention required

- **Built in microphone jack and amplifier**

with auto-gain control for direct input (sampling) of sound/speech from the real world through standard microphone (600 ohms impedance). AGC range 10mV to 100mV.

9.3 JOYSTICK PORT

- **Standard "Game I/O port" built-in**

(15 pin D-sub connector) connects any standard IBM compatible joystick (analog)

9.4 MIDI INTERFACE

- **Built-in MIDI interface**

for connection to MIDI instruments or keyboards (requires optional MIDI Connector box)

9.5 Optional 12-voice C/MS stereo music

- **C/MS or Game Blaster Compatible**

2 C/MS music synthesizer chips are optionally available to plug into the empty sockets on the card.

10 Appendix B

Hardware Data

The Sound Blaster uses the I/O port addresses from 2x0H - 2xFH. Where "x" is the number of the selectable jumper from 1 to 6.

The possible I/O addresses are 210H, 220H, 230H, 240H, 250H and 260H. (Factory default setting is 220H)

The functions of these ports are as follows:

2x0H : C/MS music voice 1-6	DATA PORT	(write only)
2x1H : C/MS music voice 1-6	REGISTER PORT	(write only)
2x2H : C/MS music voice 7-12	DATA PORT	(write only)
2x3H : C/MS music voice 7-12	REGISTER PORT	(write only)
2x8H : FM music	DATA/STATUS PORT	(write/read)
2x9H : FM music	REGISTER PORT	(write only)
2x6H : DSP RESET		(write only)
2xAH : DSP (voice I/O & MIDI) READ DATA		(read only)
2xCH : DSP WRITE DATA or COMMAND		(write)
2xCH : DSP WRITE BUFFER STATUS (bit 7)		(read)
2xEH : DSP DATA AVAILABLE STATUS (bit 7)		(read only)

The Analog Joystick port uses the standard joystick I/O addresses from 200H to 207H.

FM music can also be accessed through I/O address 388H and 389H.

11 Appendix C

Quick Reference for Problem Solving

11.1 Help for Installation

READ THIS IF YOU HAVE PROBLEMS INSTALLING SOUND BLASTER.
(Refer to: SECTION 11.2 "COMMON PROBLEMS & QUESTIONS ENCOUNTERED" for quick fix)

When installing the Sound Blaster Card, you have to beware of possible hardware conflicts with other adapter cards.

As each adapter card may be contending for various CPU resources, there are 3 possible sources of hardware conflicts :

1. DMA channel conflict
2. IRQ (Interrupt Request) lines conflict
3. I/O address conflict

In the case of Sound Blaster, it uses :

1. DMA Channel 1.
For its digitized voice input/output DMA operations.
2. Interrupt default at IRQ 7 (used for voice/MIDI operations)
Jumper selectable at IRQ 2, IRQ 3, IRQ 5 and IRQ 7
3. I/O address : 220H - 22FH as default
Jumper selectable at : 210H, 220H, 230H, 240H, 250H and 260H. FM music chip also uses addresses 388H and 389H
Joystick port uses the standard address of 200-207H

DMA CONFLICT

The DMA channel used by the Sound Blaster is not selectable. But it is able to share with other adapter cards, provided that these cards can share their DMA channel.

Alternatively, other cards using DMA could have their DMA channels selectable. However, this is only feasible on an AT type machine, where the DMA Channels 0, 1 and 3 are free. In such cases, the DMA Channel on the other card should be moved to either Channel 0 or Channel 3.

If you are using an XT machine it has only one free DMA channel, i.e. channel 1 left. If you have another adapter card that uses DMA (eg. scanner card or network card), then make sure that its DMA channel must be shareable. Otherwise you have to choose between installing Sound Blaster or the other card.

INTERRUPT LINE (IRQ) CONFLICT

The Sound Blaster uses interrupt line IRQ7 as default. Some printer interface (LPT1:) snatch away the IRQ7 even though it never requires interrupt.

In these rare case, an interrupt conflict will occur. You can change the interrupt of the Sound Blaster to IRQ5 (for AT machines) or IRQ2 (for XT machines).

(See Table 1 for the best IRQ line to use.)

I/O ADDRESS CONFLICT

The possibility of conflict on the default I/O address of 220H is very small. We advise against changing this I/O port address. Changing from this default I/O address would mean that you have to re-install many software programs that support Sound Blaster.

If there is a conflict with another card in your system, we suggest you change the I/O port address of the other card. Remember to re-install the I/O port address for programs running on that card.

Interrupt Lines	AT Machine	XT Machine
IRQ 0	-----	Used by system Timer -----
IRQ 1	-----	Used by Keyboard -----
IRQ 2	Used by System	FREE
IRQ 3	FREE (or COM Port 2)	FREE (or COM Port 2)
IRQ 4	-----	Used by COM Port 1 -----
IRQ 5	FREE	Used by Fixed Disk
IRQ 6	-----	Used by Diskette Controller -----
IRQ 7 (default on SB)	FREE (maybe LPT1:)	FREE (maybe LPT1:)

DMA Channels	AT Machine	XT Machine
DMA Channel 0	FREE	Used for RAM Refresh
DMA Channel 1	-----	Used by Sound Blaster -----
DMA Channel 2	-----	Used by Diskette Controller -----
DMA Channel 3	FREE	Used by Fixed Disk

Table 1
Interrupt and DMA Assignment

11.2 Common Problems and Questions Encountered

PROBLEM : TEST-SBC's Error 0400

CAUSE : Conflict on DMA Channel 1 with scanner card or network card, or other special cards that uses DMA channel 1.

REMEDY : Remove scanner card or network card (if you have one) and re-install its DMA to Channel 3. You need an AT machine to resolve this conflict. (see DMA CONFLICT)

Other cards that could possibly use DMA Channel 1 are: diskette COPY cards, SCSI cards or any special card. Remove these special cards one by one and run TEST-SBC to see if the error message disappears. If the error disappears, then the card that is just removed is in conflict with Sound Blaster. Check the card's manual for re-installing its DMA.

PROBLEM : TEST-SBC's ERROR FOUND ON INTERRUPT

CAUSE : Conflict on IRQ7, your system uses up IRQ7

REMEDY : Remove Sound Blaster from your system, and re-install its Interrupt jumper (refer to page 9 of manual for location of jumper) from IRQ7 to IRQ5 (for AT machines) or IRQ2 (for XT machines). Run TEST-SBC again.

If you have used up IRQ2 or IRQ5 for some other cards. You may look at IRQ7 again. Try to look for the jumper on your system board or Parallel I/O card that allows you to disable IRQ7 for LPT1:. You may consult the respective manual or your computer vendor on how to do this.

PROBLEM : Voice Recording too soft.

CAUSE : Microphone used is not sensitive enough.

REMEDY : Use a microphone that has a 600 ohm impedance and a sensitivity of -75 dB or better for good recording.
(As a rule of thumb, one that costs more than US\$30 should do the job. Remember to buy a 1/4 inch to 1/8 inch changer-jack if the microphone has a 1/4 inch jack)

PROBLEM : How to record from a stereo set?
Recording from a stereo set is too noisy.

CAUSE : You are using direct cable connection (like the one provided) to pump signal from your stereo set to the microphone jack.

REMEDY : You should not connect the stereo LINE OUTs of your stereo set to the mono microphone input. The stereo cable provided with Sound Blaster is for connecting the stereo output jack of the Sound Blaster to the LINE INs of your stereo set.

Direct electrical connection from stereo set to the mono microphone input should be only done by special stereo-to-mono mixer.
(See also microphone amplifier specifications)

We have found that recording sound from a stereo set via a good microphone as specified above could yield reasonably good result.

PROBLEM : Noise in recording.

CAUSE : The built-in microphone amplifier has a Automatic Gain Control that can accept signal peaking from 10mV to 100mV (peak to peak). Any input signal greater than 100mV will be clipped. This clipping will produce noise in the recording.

REMEDY : Reduce input signal level to within 10mV to 100mV (peak to peak)

PROBLEM : Background static noise from the speakers.

CAUSE : Noisy power supply of the computer system.

REMEDY : Computer systems are well-known to be the greatest producers of electrical noise. Much care had been taken in the design of Sound Blaster's built-in amplifier to reduce as much noise from the computer's power supply as possible. There are, however, some computer systems that simply produce too much noise. These noise are picked up and amplified to audible range when the power amplifier is set at a high volume. There is no good remedy here, except to turn down the volume control. If louder volume is desired, try to amplify using an external amplifier.

PROBLEM : "No Interrupt vector available" error when running SBFMDRV.

CAUSE : All the DOS software interrupt vectors (INT 80H - 0BFH) are taken up by a resident program that is misbehaving.

REMEDY : Most commonly, the misbehaving resident program is a DOS MENU resident program in your AUTOEXEC.BAT file. You may avoid problem with this kind of resident programs in the following ways:

1) Boot the system again from a DOS diskette and then run SBFMDRV from the \SB sub-directory to confirm that the problem is solved.

2) During the booting process of the fixed disk, press Ctrl-Break to abort the AUTOEXEC file. Then run \SB\SBFMDRV.

3) Execute \SB\SBFMDRV before running the misbehaving program in your AUTOEXEC file. i.e. Insert the line \SB\SBFMDRV before the misbehaving program. This might only solve some cases with a partially misbehaved program. With a badly misbehaved resident program, you might have to remove it from the AUTOEXEC totally.

PROBLEM : Joystick port not working

CAUSE : Sound Blaster's Joystick port conflicts with existing joystick port in the system.

REMEDY : Take out the Sound Blaster Card and remove the JOYSTICK ENABLE jumper (JP1). Use the joystick port in your system instead.

NOTE: Removing JP1 will not remove the MIDI function of the card. The MIDI pins are still active on Sound Blaster's joystick port.

QUESTION : Joystick not working properly in some programs.

ANSWER : This is a classic problem with PC's joystick port which uses the CPU timing to calculate joystick position. When a CPU is too fast and the program does not take good care of the change in CPU speed, the wrong calculation would cause the joystick port to move to its unusable range.

The Sound Blaster adheres to this PC standard and hence would inherit the same problems. You could confirm that the joystick port is working if some programs can handle the joystick properly.

The possible remedy here is to switch the computer to its lowest possible speed.

QUESTION : Is Sound Blaster's MIDI port compatible to Roland MPU 401?

ANSWER : No. The Sound Blaster implemented the MIDI standard recommended by the International MIDI Association. The MPU401 has some intelligence in its MIDI implementation. This intelligence could be easily emulated by a small driver routine in the PC. Hence, programs that run on the MPU401 cannot work directly on the Sound Blaster. They must be modified by their respective software companies in order to run on the Sound Blaster.

Before buying any MIDI software, please ensure that they support Sound Blaster.

PROBLEM : Computer hangs after running one of the Sound Blaster program.

CAUSE : Conflict with other adapter cards in the system.

REMEDY : To identify the possible conflicting card, remove all the non-essential cards one by one from the system. Leaving only the essential cards : Diskette/Fixed Disk Controller Card and Video Adapter Card, in the system.

After each card is removed, run the same program that hangs the system. If problem is solved, then the last card removed has a possible conflict with Sound Blaster. Try to determine whether it is a DMA conflict, Interrupt conflict or I/O address conflict by looking up the manuals of this card.

PROBLEM : Talking Parrot talks with a very low voice and slow voice.

CAUSE : Running the Talking Parrot on an XT machine.

REMEDY : The Talking parrot needs an AT machine to work properly. If you are using an XT, you will have to do away with this demonstration program.

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